Lesson #1: What is an Organ System?

As you know, cells do not work alone. Similar cells join together to form tissues. Tissues, in turn, form organs. Organs do important jobs. But even organs do not work alone.

Usually, several organs work together to carry out a specific life function. A group of organs that work together to do a specific job is called an organ system.

Each organ in an organ system has a specific job to do. For example, the mouth, the food pipe (esophagus), the stomach, and the small intestine are organs of the digestive system. The digestive system changes food to a form the body can use.

The human body has several other organ systems. Each organ system works to carry out one of the life functions.

Look at the chart on the next page. As you look at this chart, you will notice that some organs are part of more than one organ system.

For example:

The liver is part of the digestive system. The liver is also part of the excretory system. The excretory system gets rid of cell wastes.

The mouth is part of the respiratory system. The respiratory (breathing) system brings oxygen into the body. It also gets rid of carbon dioxide. As you already know, the mouth is part of the digestive system, too.

Your body has several organ systems. These systems all work together. And, together, they form a living organism—YOU!
<table>
<thead>
<tr>
<th>ORGAN SYSTEM</th>
<th>MAJOR ORGANS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digestive System</td>
<td>mouth, food pipe, stomach, small intestine, large intestine, liver, pancreas</td>
</tr>
<tr>
<td>Respiratory System</td>
<td>nose and mouth, windpipe, lungs (2)</td>
</tr>
<tr>
<td>Circulatory System</td>
<td>heart, blood vessels</td>
</tr>
<tr>
<td>Nervous System</td>
<td>brain, spinal cord</td>
</tr>
<tr>
<td>Excretory System</td>
<td>kidneys (2), skin, lungs, liver, large intestine, bladder</td>
</tr>
<tr>
<td>Reproductive System</td>
<td>ovaries (2) female, testes (2) male</td>
</tr>
<tr>
<td>Endocrine System</td>
<td>thyroid gland, pituitary gland, thymus</td>
</tr>
<tr>
<td>Muscular system</td>
<td>muscles</td>
</tr>
<tr>
<td>Skeletal System</td>
<td>bone</td>
</tr>
</tbody>
</table>
Assignment # 1: What is an Organ System?

LABEL THE PICTURE
The pictures below show what you have just read about: organs, organisms and organ systems. Which is which? Write the correct name on the line under the picture. (3 marks)

Figure A: ___________  Figure B: ___________  Figure C: ________

GLANDS
The organs shown in Figure D are glands. Glands make up the endocrine system. Glands make chemicals the body needs to carry out the life functions. (3 marks)

1. What Organ system do the organs in Figure D belong to?
   ________________

2. What organs of this organ system does a female have that a males does not have?
   ________________

3. What organs of this system does a male have that a female does not have?
   ________________

Figure D
## ORGANS - COMPLETE THE CHART

(10 marks)

The organs of some of the organ systems are listed in the first column of the chart. Make a check mark (✓) in the other columns if the organ belongs to any of the other systems. Remember: An organ may belong to more than one system!!

<table>
<thead>
<tr>
<th>No.</th>
<th>ORGANS</th>
<th>ORGAN SYSTEMS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Digestive</td>
</tr>
<tr>
<td>1</td>
<td>large intestine</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>bladder</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>brain</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>ovaries</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>nose</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>liver</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>blood vessels</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>kidneys</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>spinal cord</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>lungs</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>heart</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>small intestine</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>mouth</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>bone</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>windpipe</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>food pipe</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>skins</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>testes</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>stomach</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>thyroid</td>
<td></td>
</tr>
</tbody>
</table>
FILL IN THE BLANK
(12 marks)
Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some words may be used more than once.

respiratory tissues excretory
organ system circulatory digestive
organ more than one organism

1. Cells group together to form ________________________
2. Tissues working together make up an __________________
3. Two or more organs working together make up an ____________________
4. Organ systems make up an __________________________
5. Sometimes, an organ may work in ____________ system.
6. The liver is part of the ______________ system. It is also part of the ____________ system.
7. The large intestine is part of the ______________ system. It is also part of the ____________ system.
8. The heart is part of the ______________ system.
9. The lungs are part of the ______________ system. It is also part of the ____________ system.

MATCHING
Match each term in Column A with its description in Column B. Put your answer in the Column titled, Your Answer. You are to take the each letter beside an item in Column B and write it beside the item in Column A that it is describing. (6 marks)

<table>
<thead>
<tr>
<th>Your Answer</th>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>kidney</td>
<td>A</td>
<td>organ of the nervous system</td>
</tr>
<tr>
<td>ovaries</td>
<td>B</td>
<td>organ of the excretory system</td>
</tr>
<tr>
<td>spinal cord</td>
<td>C</td>
<td>group of organs working together</td>
</tr>
<tr>
<td>organ system</td>
<td>D</td>
<td>part of the digestive and respiratory systems</td>
</tr>
<tr>
<td>mouth</td>
<td>E</td>
<td>organs of the reproductive system</td>
</tr>
<tr>
<td>excretory</td>
<td>F</td>
<td>removed from the organism</td>
</tr>
</tbody>
</table>

What is the Skeletal System?

Have you ever seen a house being built? The first thing that goes up is the frame. It supports the entire house.

Humans, and many other animals, have a frame, too. It supports their bones. This frame is the skeleton. Some animals, like crabs and insects, have a hard outer skeleton called an exoskeleton. Humans, and other vertebrates, have an internal skeleton, or endoskeleton.
The human skeleton is made mostly of bone. It also has some softer tissues called cartilage. Your ears and the tip of your nose are made of cartilage. Squeeze them gently. They can move. You cannot bend bone that way!
Cartilage also lines the inner surface of most joints. A joint is the meeting place of two bones. Cartilage in the joints acts like a shock absorber. It cushions the bones.

The human skeleton has 206 bones. The skeleton supports the body, but it does even more. For example the skeleton also protects vital organs, allows free movement, and makes red and white blood cells.

PROTECTION Think about your body. Your brain, heart, and lungs are three of your vital organs. These organs are protected by bones. Your skull protects your brain. Your ribs and breastbone (sternum) protect your heart and lungs.

MOVEMENT Some joints are moveable. Other joints are not moveable. For example, the joints of your skull are not moveable. The joints of your arms, legs, hands, and feet, however, are moveable.

Most joints are held together by ligaments. Ligaments stretch easily. This allows the bones to move easily. Bones and muscles work together to produce movement.

BLOOD CELL PRODUCTION Bones have tube-like canals. They are filled with soft tissue called marrow. Red blood cells and some white blood cells are made in the bone marrow.

Assignment #2: What is the Skeletal System? (29 marks)

FILL IN THE BLANK

Figure A shows many of the 206 bones of the human skeleton. Study the diagram and complete the following.

1. The human skeleton is an _______ skeleton.

2. What do we call an internal Skelton?

3. The human skeleton is made mostly of hard _____ tissue

4. What do we call the flexible tissue that makes up some parts of the skeleton? ____________

5. Name two parts of the skeleton that are made of this tissue: ___________ and ____________
Complete the below finding the scientific name for each of the following bones as shown in the drawing on page 6.

<table>
<thead>
<tr>
<th>Bone</th>
<th>Scientific Name</th>
<th>Bone</th>
<th>Scientific Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>kneecap</td>
<td></td>
<td>hip bone</td>
<td></td>
</tr>
<tr>
<td>shin bone</td>
<td>collar bone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>skull</td>
<td>backbone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>breastbone</td>
<td>jaw bone</td>
<td></td>
<td></td>
</tr>
<tr>
<td>thigh bone</td>
<td>shoulder blade</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7. What two bones make up the lower leg? _____________________

8. What is the name of the place where two bones meet? ______________

9. Which bone is the most important for talking? _________________

10. What bones make up the spinal column? _________________

11. In Figure A, there are letters beside the various joints of the human skeleton. In the chart below, write the letter from the diagram beside the appropriate joint.

   knee joint | elbow
   ankle      | jaw joint
   wrist      | hip joint
   shoulder joint

12. Item #9 in Figure A points to cartilage.
   a) Which bones does this cartilage connect? _____________________
   b) Why must these parts be made of cartilage? _____________________

13. Item #10 in Figure A also points to cartilage.
   a) Which bones do these cartilage “discs” connect? ______________
   b) Why are these cartilage discs important? _____________________

JOINTS

Bones move only at joints. There are three main kinds of joints in the body. They are fixed joints, partly-moveable joints, and moveable joints. Fixed joints do not allow any movement. The joints of your skull are not moveable. Partly-moveable joints allow a little movement. The joints between your ribs move a little. However, most of the joints in the body are moveable joints. There are four kinds of moveable joints. They are described in the next section.
Figure B shows a ball-and-socket joint. It can be twisted and permits movement in many directions. This includes rotating movements. The shoulder joint is an example of a ball-and-socket joint.

Name another ball-and-socket joint: ________
(1 mark)

Figure C shows a hinge joint. It can move in only one direction, like a door hinge. The knee is an example of a hinge joint.

Bend your elbow. How many directions can your elbow bend? __________ (1 mark)

Name another hinge joint in your body. __________ (1 mark)

Figure D shows a gliding joint, which allows some movement in all directions. Your wrist has gliding joints.

Figure E shows pivotal joints, which allow bones to move from side-to-side, and up-and-down. The joint between your skull and neck is a pivotal joint.
MATCHING
Match each term in Column A with its description in Column B. Put your answer in the Column titled, Your Answer. You are to take the each letter beside an item in Column B and write it beside the item in Column A that it is describing.  (6 marks)

<table>
<thead>
<tr>
<th>Your Answer</th>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>backbone</td>
<td>A</td>
<td>hinge joint</td>
</tr>
<tr>
<td>shoulder joint</td>
<td>B</td>
<td>connects moveable bones</td>
</tr>
<tr>
<td>elbow joint</td>
<td>C</td>
<td>made up of vertebrae</td>
</tr>
<tr>
<td>cartilage</td>
<td>D</td>
<td>fills some bone canals</td>
</tr>
<tr>
<td>marrow</td>
<td>E</td>
<td>ball-and-socket joint</td>
</tr>
<tr>
<td>Gliding joint</td>
<td>F</td>
<td>Allows movement in all directions</td>
</tr>
</tbody>
</table>

FILL IN THE BLANK
Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some words may be used more than once. (10 marks)

1. The human skeleton is an ________________ skeleton.
2. The human skeleton is made up of 206 ________ and some __________________.
3. The ___________ and the tip of the ___________ are made of cartilage.
4. Bones serve 4 purposes. Bones __________ ________ allow _____________, and make _________________.
5. The brain is protected by the bones of the ________________.
6. The heart and lungs are protected by the __________ and __________________.
7. The backbone encloses and protects the ________________.
8. The place where two bones meet is called a ____________________.
9. Two kinds of moveable joints are the _________ and ________________________
10. Bones at moveable joints are connected to one another by _____________________.

Lesson #2: How is Food Digested?

People, like all living things, need food. Food gives us the nutrients our bodies need. It also gives us energy. Energy is needed to carry out the life processes.

Our bodies cannot use the nutrients or energy in food unless the food is changed. The changing of food into a form the body can use is called digestion.
What does digestion do? Digestion breaks down large pieces of food into smaller pieces. Digestion also changes the chemicals of food. It changes large, complex food molecules into smaller, simpler ones.

Where does digestion take place? Digestion takes place in the digestive tract. The digestive tract is a long, curving tube in your body. If stretched out, the digestive tract would be more than 9 meters (30 feet) long.

What are the parts of the digestive tract? The parts of the digestive tract are: the mouth, the esophagus, the stomach, the small intestine, and the large intestine.

There are many glands and organs along the digestive tract, such as the liver and the pancreas. These organs are not part of the digestive tract, but they help in digestion. The digestive tract and the other digestive organs make up your digestive system.

Food enters the body through the mouth. Waste materials (undigested food) leave the body through the anus. The anus is at the end of the large intestine.

Digestion is a step-by-step process. It does not take place quickly. It takes food from one to two days to pass through the entire digestive tract.

WHAT THE PARTS OF THE DIGESTIVE TRACT DO?
Read the descriptions below to find out what happens as food moves through the digestive tract.

1. Food enters the body through the mouth. Digestion begins here. The teeth break food into smaller pieces. Saliva moistens the food. Saliva also begins the chemical breakdown of starch.

2. When you swallow, food passes into the esophagus. Food passes through the esophagus and into the stomach.

3. What happens to food in the stomach? The stomach churns food and breaks it into even smaller pieces. The chemical digestion of protein begins. Partially digested food then moves to the small intestine.

4. Most digestion takes place in the small intestine. The small intestine is also where all digestion is completed. Undigested food (waste) then passes into the large intestine.

5. Undigested food (waste) is not used by the body. The large intestine stores and eliminates undigested food as solid waste.

6. Solid waste is passed out of the body through the anus.

NOTE: The anus is not a digestive organ.
HOW FOOD MOVES ALONG THE DIGESTIVE TRACT

Food in the digestive tract does not move by itself. Food is squeezed along the digestive tract by wavelike movements of muscles. These muscles work by themselves. We do not have to think about moving food. It is an involuntary action. The wavelike movement is called “peristalsis”. Peristalsis starts in the esophagus right after you swallow. It continues along the entire digestive tract. Peristalsis works in only one direction—except when we are ill. For example, reverse peristalsis in the stomach or esophagus causes us to “throw up”. Throwing up, or vomiting, is one way the body gets rid of things that can harm us.

Assignment #1: The Digestive System

FILL IN THE BLANK

Figure A shows the organs of the digestive system. Study the drawing, and answer the questions below. (5 marks)

1. Name the parts of the digestive tract that food passes through in the order that it occurs. (Do not include the anus) ____________________________________________________

2. The digestive tract has two openings to the outside of the body. Food enters the body through the _________. Waste materials leave the body through the ____________.

3. Where does chemical digestion start? __________

4. Where does most chemical digestion take place? __________

5. What are two organs that are part of your digestive system, but not part of the digestive tract? ______________ and ____________.
FILL IN THE BLANK
Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some words may be used more than once. (11 marks)

1. The changing of food to a form the body can use is called ________________.
2. Digestion breaks down large pieces of food into ________________ pieces.
3. Digestion also makes food molecules ________________.
4. Digestion takes place in a body tube called the ________________.
5. The parts of the digestive tract (in order) through which food passes are the ________, the ________, the ________, the ____________________, and the ________________.
6. In the mouth, food is broken into smaller pieces by the ________________.
7. Food in the mouth is moistened by the ________________.
8. Starch digestion starts in the ________________.
9. Protein digestion starts in the ________________.
10. Most digestion takes place in the ________________. This is also where all digestion is ________________.
11. Organs such as the ________ and ________ help in digestion, but are outside the digestive tract.

IDENTIFY THE PARTS OF THE DIGESTIVE TRACT
Using the letters in Figure B, write the correct letter beside the name of the part in the table. (5 marks)

<table>
<thead>
<tr>
<th>Item</th>
<th>Letter from Figure D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small intestine</td>
<td></td>
</tr>
<tr>
<td>Mouth</td>
<td></td>
</tr>
<tr>
<td>Stomach</td>
<td></td>
</tr>
<tr>
<td>Large intestine</td>
<td></td>
</tr>
<tr>
<td>esophagus</td>
<td></td>
</tr>
</tbody>
</table>
Lesson #3: What are the Reproductive Organs?

Reproduction is a vital life process. Without it, all living things would die out.

Unlike most of the other body systems, the reproductive system differs in males and females. These differences begin to show up as early as six weeks after a baby begins to develop.

There are two kinds of reproduction- asexual and sexual. In asexual reproduction, only one parent is needed. In sexual reproduction, two parents, one male and one female, are needed.

Humans, and many plants and animals reproduce sexually. The method of reproduction varies from one organism to another, but one thing is certain. A male reproductive cell, a sperm, must unite with a female reproductive cell, an egg. Only then, can development and growth of a new organism begin.

What are the parts of the human male and female reproductive systems? In this lesson, we will study both the male and female reproductive systems, and what makes up each organ system.

THE FEMALE REPRODUCTIVE SYSTEM

The female reproductive system has four main parts. They are the ovaries, the oviducts, the uterus, and the vagina. Look at Figure A and find each organ as its function is explained.

THE OVARIES
There are two ovaries, one on each side of the uterus. Each ovary is about the size and shape of a flattened, lumpy olive. The ovaries are the main female sex organs. The ovaries contain two kinds of cells. One kind of cell produces eggs. The other kind of cell produces hormones. These hormones are responsible for the development of secondary sex characteristics, and the onset of puberty.

THE OVIDUCT
There are two oviducts. Each oviduct extends from the uterus to one of the ovaries. The side of the oviduct closest to the ovary has fingerlike projections. Oviducts also are called fallopian tubes.
Once a month, an egg released by one of the ovaries, enter the oviduct. The egg moves through the oviduct and enters the uterus. Fertilization, when it takes place, occurs within one of the oviducts.

THE UTERUS
The uterus, or womb, is shaped somewhat like an inverted pear. It is a hollow thick-walled muscular organ. It is within the uterus that an embryo develops. The lower end of the uterus is called the cervix.

THE VAGINA
The cervix connects the uterus to the vagina. A baby moves through the vagina as it is being born. For this reason, the vagina also is called the birth canal.

ABOUT EGGS
A human egg also is called an ovum. It is about the size of a pinpoint. This is large compared to other cells. In fact, an egg can be seen without a microscope. Each egg has the potential to develop into an embryo, if it joins with a male sex cell.

OVULATION AND MENSTRUATION
At birth, a baby girl has all the egg cells she will have in her lifetime. However, the eggs are not fully mature. Egg cells begin to mature at the onset of puberty. Girls usually reach puberty between the ages of 10 and 14. Puberty is marked by the beginning of menstruation.

The menstrual cycle occurs every 28-32 days. It is started by the release of hormones in the body. Use the figure below to follow the path of an egg.

During the first stage, a hormone causes an egg to mature. The uterine wall begins to thicken with blood vessels.

During the second stage, the egg is released from the ovary into the oviduct. This is called ovulation.
During the third stage, the uterine wall continues to thicken. This prepares the uterus for an embryo, if the egg has been fertilized.

The fourth stage only occurs if the egg has not been fertilized. The tissue, blood, and mucus that were lining the uterine wall, break down and leave the body. This process is called menstruation.

THE MALE REPRODUCTIVE SYSTEM

The male reproductive system also has four main parts. They are the testes, the urethra, the vas deferens and the penis. Look at Figure E and find each organ as its function is explained.

THE TESTES
The testes are the main male reproductive organs. The singular form of testes is a testicle. The testes, like the ovaries, contain two kinds of cells. One kind of cell produces sperm. The other kind of cell produces hormones, which are responsible for the development of secondary sex characteristics. The testes are located outside the body in a sac called the scrotum.

THE VAS DEFERENS
The vas deferens is a tube that leads from each testicle into the urethra. When sperm are released, they enter and move through the vas deferens into the urethra.

THE URETHRA
The urethra is a tube located inside the penis. As the sperm enter the urethra, several glands secrete fluid. The fluid helps the sperm move easier. The combination of the fluid and sperm is called semen. Semen is released through the penis during ejaculation.

The urethra also is part of the male's excretory system. Urine travels from the bladder out of the body through the urethra.

ABOUT SPERM
A sperm has two parts, a head and a tail. Sperm are much smaller than eggs. You need a microscope to see them.

Figure F shows a single egg cell and several sperm cells. Notice how much larger the egg is.

Figure G shows a magnified picture of sperm. Notice the head and the tail of the sperm.
Assignment #1: Understanding Reproduction

THE FEMALE REPRODUCTIVE SYSTEM
Figure A shows the human female reproduction organs. Without looking back at the lesson content, try to identify them by writing the letter beside the correct name in the table.

**COMPLETE THE TABLE (5 marks)**

<table>
<thead>
<tr>
<th>Letter</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>uterus</td>
</tr>
<tr>
<td></td>
<td>ovaries</td>
</tr>
<tr>
<td></td>
<td>vagina</td>
</tr>
<tr>
<td></td>
<td>oviduct</td>
</tr>
<tr>
<td></td>
<td>cervix</td>
</tr>
</tbody>
</table>

Answer the following questions about the female reproductive system. - (5 marks)

1. What are the female reproductive cells called? ______________
2. Where are the eggs stored? ______________________________
3. Where does an embryo develop? __________________________
4. Where does fertilization take place? _____________________
5. How does an egg reach the uterus? _______________________

THE MALE REPRODUCTIVE SYSTEM
Answer the following questions about the male reproductive system. (6 marks)

1. What are the male reproductive cells called? _______________________
2. Where are the sperm produced? ________________________________
3. Into which tubes are sperm first released? _____________________
4. Name the tube through which sperm finally leave the body. ______________
5. Of what use do you think the sperm’s tail is? _____________________
6. Does an egg have a tail? _____________________________________
MATCHING
Match each term in Column A with its description in Column B. Put your answer in the Column titled, Your Answer. You are to take the each letter beside an item in Column B and write it beside the item in Column A that it is describing. (11 marks)

<table>
<thead>
<tr>
<th>Your Answer</th>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>cervix</td>
<td>A</td>
<td>tube that leads from testes to urethra</td>
</tr>
<tr>
<td>eggs</td>
<td>B</td>
<td>narrow end of the uterus</td>
</tr>
<tr>
<td>ovaries</td>
<td>C</td>
<td>pocket of skin that holds the testes</td>
</tr>
<tr>
<td>oviduct</td>
<td>D</td>
<td>organ in which an embryo develops</td>
</tr>
<tr>
<td>scrotum</td>
<td>E</td>
<td>tube that carries sperm and urine to the outside of the body</td>
</tr>
<tr>
<td>sperm</td>
<td>F</td>
<td>long tube between the ovary and the uterus</td>
</tr>
<tr>
<td>testes</td>
<td>G</td>
<td>main organs the male reproductive system</td>
</tr>
<tr>
<td>urethra</td>
<td>H</td>
<td>female sex cells</td>
</tr>
<tr>
<td>uterus</td>
<td>I</td>
<td>males sex cells</td>
</tr>
<tr>
<td>vagina</td>
<td>J</td>
<td>organs that produce female sex cells</td>
</tr>
<tr>
<td>vas deferens</td>
<td>K</td>
<td>birth canal</td>
</tr>
</tbody>
</table>

How Does Fertilization Take Place?

As you have just learned, about once every 28 days, a female ovulates. One of her eggs is released from the ovary and travels into the oviduct on its journey to the uterus. Tiny hairs line the oviduct. The motion of these hairs moves the egg towards the uterus. If fertilization is to take place, a single sperm must reach and penetrate that egg in the oviduct. Fertilization is the joining of a sperm and an egg.

How do the egg and sperm meet up? An egg is passive. It cannot move by itself. A sperm cell, however, can move. The sperm has a long tail. The motion of this tail moves the sperm.

The fertilization race is on! During ejaculation, millions of sperm cells are released. However, only one sperm can penetrate the egg. The egg gives off a chemical that attracts the sperm. The millions of sperm swim towards the egg. Only a small percent of the sperm reach the oviduct. Even fewer reach the egg. The sperm that reach the egg surround it. Each sperm tries to penetrate the egg. But there can be only one winner!

The successful sperm penetrates the egg and its nucleus. At that moment, fertilization takes place. The egg develops a protective membrane around itself to keep other sperm from penetrating the egg.

The fertilized egg, or zygote, starts to divide. It moves into the uterus and attaches itself to the uterine wall. Cell division then proceeds at a faster rate. In nine months, a new person will be born.
HUMAN FERTILIZATION

Figures A, B, and C below show the steps of human fertilization.

1. The ovary releases a mature egg.
2. The egg enters the oviduct.
3. The egg moves along the oviduct.
4. Millions of sperm enter the female reproductive system through the vagina.
5. The sperm swim toward the oviduct and the egg.
6. Only a few sperm reach the egg.
7. One sperm penetrates the ovum and its nucleus, and fertilization takes place.
8. The fertilized egg (zygote) attaches itself to the uterine wall.

HOW A ZYGOTE BECOMES A BABY

After fertilization the zygote is a single cell. This is one case where one plus one equals one! The zygote divides by mitosis. Two attached cells are formed. Again they divide by mitosis and become four attached cells. The cell division continues until a hollow ball of cells is formed. The hollow ball of cells attaches itself to the uterine wall. The mass of cells is now called an embryo. All of the tissues and organs of the body form from the cells in the embryo.

Mitosis in a zygote
The tissue that surrounds the embryo develops into a thick, flat structure called the placenta. The embryo is attached to the placenta by the umbilical cord. The umbilical cord is a ropelike structure that has two large blood vessels. One blood vessel carries nutrient-rich blood to the embryo. The other blood vessel carries wastes away from the embryo.

The developing embryo is also protected by a clear, fluid-filled sac called the amnion.

**After about eight weeks**, the embryo begins to develop a heart, brain, and nerve cord. The eyes and ears also begin to form. Arm and leg buds begin to form with fingers and toes. The cartilage in the embryo’s skeleton starts to be replaced with bone. After bone replacement is complete, the embryo is called a fetus. The fetus looks more like an infant. The fetus continues to develop rapidly.

**After about nine months**, the fetus is fully developed. It is ready! Hormones in the mother cause the uterus to tighten, or contract.

The contractions of the uterus are called labor. The contractions become stronger and more frequent.

The muscles in the uterine wall start to push the baby out.
Labor continues until the baby's body is pushed out of the mother's body. Further contractions push the placenta out of the mother's body.

Hi little one! Happy Birthday!

Assignment #2:  HUMAN FERTILIZATION

FILL IN THE BLANK - (8 marks)
1. How many eggs are released during ovulation? ____________________________
2. Where does fertilization takes place? ______________________
3. How many sperm fertilize an egg? ______________________
4. How do sperm move? ________________________________
5. What is a fertilized egg called? ______________
6. What is an embryo? ______________________________________
7. How does the embryo receive nourishment? ______________________________
   ______________________________________
8. Why do you think it is important for the embryo to get nourishment and to get rid of wastes?
   ______________________________________

MATCHING
Match each term in Column A with its description in Column B. Put your answer in the Column titled, Your Answer. You are to take the each letter beside an item in Column B and write it beside the item in Column A that it is describing. (6 marks)

<table>
<thead>
<tr>
<th>Your Answer</th>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>amnion</td>
<td>A</td>
<td>ball of cells formed by cell division</td>
</tr>
<tr>
<td>embryo</td>
<td>B</td>
<td>fertilized egg</td>
</tr>
<tr>
<td>fetus</td>
<td>C</td>
<td>rope-like structure</td>
</tr>
<tr>
<td>ovulation</td>
<td>D</td>
<td>embryo in which bone replacement is complete</td>
</tr>
<tr>
<td>umbilical</td>
<td>E</td>
<td>clear fluid-filled sac</td>
</tr>
<tr>
<td>zygote</td>
<td>F</td>
<td>release of a mature egg from the ovaries</td>
</tr>
</tbody>
</table>
MULTIPLE CHOICE – (13 marks)

On the line provided, write the letter of the word that best completes each statement.

1. A mature egg leaves an ovary and travels to an oviduct during __________
   a) menstruation.   b) ovulation.   c) mitosis.   d) fertilization.

2. The umbilical cord connects the embryo to the __________
   a) amnion.   b) cervix.   c) uterus.   d) placenta.

3. In males, both urine and sperm leave the body through the __________
   a) urethra.   b) scrotum.   c) gamete.   d) testes.

4. A developing embryo is cushioned and protected by __________
   a) an umbilical cord.   b) the ovaries.   c) the amnion.   d) the placenta.

5. The menstrual cycle is a series of changes in a female reproductive system that occur about __________
   a) once a week.   b) once a month.   c) once a year.   d) twice a year.

6. The new cell produced by fertilization is called __________
   a) an egg.   b) an amnion.   c) a zygote.   d) an oviduct.

7. The ovaries produce both hormones and __________
   a) sperm.   b) eggs.   c) zygotes.   d) urine.

8. An embryo receives nourishment and gets rid of wastes through the __________
   a) amnion.   b) umbilical cord.   c) placenta.   d) uterus.

9. A zygote attaches to the wall of the __________
   a) uterus.   b) ovary.   c) vagina.   d) cervix.

10. The process by which blood and the tissue lining leave the uterus is __________
    a) ovulation.   b) birth.   c) menstruation.   d) meiosis.

11. The main organs of the male reproductive system are __________
    a) sperm cells.   b) urethras.   c) testosterones.   d) testes.

12. When a mature egg is released from the ovary, it passes through the __________
    a) vagina.   b) cervix.   c) uterus.   d) oviduct.

13. Which of the following only can occur during ovulation? __________
    a) menstruation   b) fertilization   c) meiosis   d) mitosis
WORD SCRAMBLE - (5 marks)

1. YOBREM
2. YSTOEG
3. TACNELAP
4. TUSEF
5. ZATFERNIOLTII

REACHING OUT – (2 marks)
At birth, the placenta is still connected to the infant by the umbilical cord. Why do doctors remove the umbilical cord upon birth?

Lesson #4: How Do Drugs Affect The Body?

Have you ever taken drugs? Think first before answering. A drug is any chemical substance that causes a change in the body. Drugs can cause physical changes in the body. They can also change behavior.

Drugs can be helpful. They can cure and prevent disease. They can relieve pain. There are two kinds of drugs for medical use, over-the-counter drugs and prescription drugs. Aspirin, decongestants, and antacids are common over-the-counter drugs. You can buy them in any store without a doctor’s permission. Prescription drugs, however, can only be purchased with a written prescription from a doctor. All drugs, prescription and over-the-counter, should be taken with great care. You should always follow label directions.

Most people use drugs wisely. Some people unfortunately abuse them. Drug abuse is the improper use of a drug. How are drugs abused? Sometimes people take too much of a drug, or take it for the wrong reason. The use of illegal drugs also is drug abuse. Why do you think some people abuse drugs?

Many drug abusers become physically or emotionally dependent on a drug. This means the body cannot get along without the drug. Other problems of drug abuse include tolerance. Tolerance occurs when the body gets used to the drug. The individual needs stronger and stronger doses to achieve the same effect. Tolerance can lead to a drug overdose and even death.

In order to treat drug abuse, a person must first go through withdrawal. Symptoms of withdrawal include chills, fever, vomiting, and even convulsions. These symptoms can last as short as a few days or as long as a few weeks.
There is a much better way to avoid all of these symptoms - **SAY NO TO DRUGS** from the very beginning.

Scientists classify drugs according to the effects they have on the body.

**Stimulants** are drugs that speed up the action of the central nervous system. They speed a person's heart rate and breathing. Examples: caffeine, cocaine, and nicotine.

Cocaine is a commonly abused stimulant. Crack is a purified form of cocaine. Caffeine also is commonly abused and is found in coffee, tea, cola, and chocolate. Nicotine is found in tobacco.

Depressants are drugs that slow down the action of the central nervous system. They slow down a person’s heart rate and breathing. Large amounts of depressants can cause a person to go into a coma, or even die. Examples are: tranquilizers, barbiturates, and alcohol.

Barbiturates often are used in sleeping pills. They also have many other medical uses.

**Narcotics** are depressant drugs made from the opium plant. Some common examples of narcotics include morphine and codeine. Morphine and codeine are often used as painkillers. Another narcotic is heroin. Heroin is an illegal narcotic that has no medical use.

Hallucinogens are drugs that distort or alter the senses. Hallucinogens cause a person to feel panic or threatened. For this reason, people who take hallucinogens are dangerous to themselves and to others. LSD and marijuana are two commonly abused hallucinogens.

Hallucinogens also cause the brain to "see" things that are not really there, such as color, figures, designs, movement. For example, an LSD user may feel capable of doing impossible things, such as flying without a plane.

Marijuana is the most widely abused illegal drug in the United States. It comes from a plant and usually is smoked. Marijuana causes the user to have hallucinations, but also slows down the central nervous system. For this reason, marijuana often is classified as a depressant.
Assignment #1:  Drugs

STIMULANT, HALLUCINOGEN, NARCOTIC, & DEPRESSANT
COMPLETE THE CHART – (6 marks)

Beside each of the drugs listed in the chart, write beside in the column directly beside it whether that item is a stimulant, hallucinogen, narcotic, or depressant.

<table>
<thead>
<tr>
<th>ITEM</th>
<th>DRUG</th>
<th>CLASSIFIED AS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Caffeine</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Barbiturate</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Nicotine</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Crack</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Marijuana</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Cocaine</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>LSD</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Alcohol</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Morphine</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Tranquilizer</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Heroin</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Codeine</td>
<td></td>
</tr>
</tbody>
</table>

MATCHING – (6 marks)
Match each term in Column A with its description in Column B. Put your answer in the Column titled, Your Answer. You are to take the each letter beside an item in Column B and write it beside the item in Column A that it is describing.

<table>
<thead>
<tr>
<th>Your Answer</th>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>drug</td>
<td>A</td>
<td>any chemical that causes a change in the body</td>
</tr>
<tr>
<td>addiction</td>
<td>B</td>
<td>drug that slows down the central nervous system</td>
</tr>
<tr>
<td>depressant</td>
<td>C</td>
<td>uncontrollable dependence on a drug</td>
</tr>
<tr>
<td>drug abuse</td>
<td>D</td>
<td>when the body gets used to a drug</td>
</tr>
<tr>
<td>tolerance</td>
<td>E</td>
<td>improper use of a drug</td>
</tr>
<tr>
<td>narcotic</td>
<td>F</td>
<td>Used as pain killers</td>
</tr>
</tbody>
</table>
MATERIALS: WHAT YOU NEED
3 different over-the-counter drug or medication labels or packaging

PROCEDURE: How To Do The Experiment - (5 marks)

1. Examine each one of your drug or medication labels.
2. Write the name of the drug or medication and its use.
3. Find the dosage instructions and record the dosage.
4. Record the expiration date.
5. Record any special warnings or precautions given for the drug or medication.

What are your observations:

1. What 2 things are given in the dosage instructions for a drug or medications?

2. Do the dosages differ for different age groups? If so, give an example.

3. What frequencies for taking the drugs or medications did you find?

4. List the types of information that you can obtain from drug or medication labels.

How Does Alcohol Affect The Body?

The use, or more accurately, the abuse of alcohol is a growing problem. It demands national attention. What is alcohol and how does it affect a person? Simply and bluntly stated, alcohol is a drug, a nonprescription drug. It's a drug that the law allows you to buy and to use, if you are over the "legal drinking age".
Alcohol is all around us. How many liquor stores and bars are there in your town? Open any magazine or newspaper, and you will probably see many ads for beer and other alcoholic beverages. The same goes for television.

People drink for many reasons. They drink at meals, to be sociable, for celebrations. Other people drink to be part of the “in crowd” Others drink to ease stress. In fact, name any event or situation, and some people will use that as a reason to drink. Often one drink leads to another, and another, and another. Before long, some individuals do little more than drink. They have become dependent upon alcohol. These people have become. Their body craves alcohol.

Many people feel that alcohol is a stimulant drug. it may be, but just for a short time. Then the alcohol slows down the body and mind. In reality, alcohol is a depressant, a “real downer”. Alcohol abuse can cause many health and personal problems.

**BLOOD ALCOHOL CONCERNTRATION (BAC)**

The amount of alcohol present in the bloodstream is called the Blood Alcohol Concentration (BAC). The affect of alcohol on the body increases as the level of alcohol in the bloodstream increases. The way alcohol affects someone depends upon many different factors.

**EFFECT OF ALCOHOL ON THE BODY**

**Circulation**

Alcohol damages the heart as well as the blood vessels. Alcoholics often have heart disease as well as high blood pressure. Excessive alcohol can slow down the heart rate so much that it stops.

**Digestion**

Alcohol damages the lining of the esophagus, stomach and small intestine. It can cause painful ulcers. Continued drinking makes the ulcers, and the pain, worse.
Heavy drinking also damages the liver. Alcohol breaks down the liver cells. As the liver cells are damaged or destroyed, they are replaced with scar tissue. This condition is called cirrhosis of the liver. Eventually the liver stops functioning. Cirrhosis of the liver is a major cause of death among heavy drinkers. **Figure C** shows a liver damaged by cirrhosis.

**Figure C**: A healthy liver, a fatty liver, and a liver damaged by cirrhosis.

Further liver damage is caused by malnutrition. Drinkers usually have poor diets, and therefore do not receive all the proper minerals and vitamins.

**AFFECT OF ALCOHOL ON THE MIND**

Alcohol affects people in different ways. Alcohol can change a person's personality. A normally peaceful person may become aggressive. This can lead to violent behavior.

Heavy drinking can cause a person to lose his or her job. It can lead to divorce and family break-up. Some alcoholics end up as homeless people who must beg for money.

Alcohol use and abuse can kill, not only the drinker, but innocent people too. Alcohol blurs vision, affects judgment and slows reaction time. Tragically, auto accidents caused by "alcohol impaired" drivers are on the rise. About one-half of all traffic deaths are alcohol related.
Assignment #2:  Alcohol

<table>
<thead>
<tr>
<th>Drinks Per Hour</th>
<th>BAC (percent)</th>
<th>Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.02 - .03</td>
<td>Feeling of relaxation</td>
</tr>
<tr>
<td>2</td>
<td>.05 - .06</td>
<td>Slight loss of coordination</td>
</tr>
<tr>
<td>3</td>
<td>.08 - .09</td>
<td>Loss of coordination, slurred speech and trouble thinking</td>
</tr>
<tr>
<td>4</td>
<td>.11 - .12</td>
<td>Lack of judgement, increased reaction time</td>
</tr>
<tr>
<td>7</td>
<td>0.20</td>
<td>Difficulty thinking, walking, talking</td>
</tr>
<tr>
<td>14</td>
<td>0.40</td>
<td>Unconsciousness, vomiting</td>
</tr>
<tr>
<td>17</td>
<td>0.50</td>
<td>Deep coma, if breathing stops death occurs</td>
</tr>
</tbody>
</table>

One drink = 1 oz. Whiskey, 4 oz. wine, or 12 oz beer

Figure A – Blood Alcohol Concentration and Its Effects

1. What does BAC stand for? _________________________________________________
2. Unconsciousness or vomiting occurs at what BAC percentage? ________________
3. What is the effect of drinking one drink? ________________________________
4. Speech and loss of coordination occurs after how many drinks? ______________
5. How much whiskey is equivalent to 12 oz. of beer. __________________________
6. What can result from BAC of .50%? ________________________________________
7. If one drink is made with 2 OZ. of whiskey, what BAC level will result? ______
8. Why would it be dangerous to drive after having 4 drinks? __________________

9. Difficulty thinking, walking, and talking occurs at what BAC level? __________
10. What is alcoholism? ______________________________________________________
11. What effect does alcohol have on the liver? ________________________________

HELP FOR ALCOHOLICS

Alcoholism is a disease. However, there is help for alcoholics and their families. Many alcoholics get help from groups such as Alcoholics Anonymous. Teenage children of alcoholic parents or siblings can get help from groups such as AL-ATEEN.

Imagine that you have a relative or friend who has a drinking problem. What would you do to help this person? (4 marks)
How Does Tobacco Affect The Body?

What is tobacco and why is it so harmful to the body? Have you ever asked yourself that question? Tobacco is the shredded leaf of the tobacco plant. Tobacco contains more than a thousand different products. Many of these products are harmful especially when they are smoked.

Three of the most harmful tobacco products are tar, nicotine, and carbon monoxide.

NICOTINE is a stimulant drug. It makes the heart beat faster, which raises blood pressure. It increases blood pressure and damages the nervous system. In large amounts, nicotine is fatal.

CARBON MONOXIDE is a gas produced when tobacco burns. Carbon monoxide is a very poisonous gas. It takes the place of red blood cells in the blood stream. As a result, less oxygen gets into the cells. This causes dizziness, drowsiness, and headaches. Carbon monoxide can damage the brain.

TAR is a sticky yellowish substance. Much of it sticks to the lungs after the tobacco smoke is exhaled. A filter on a cigarette reduces tar, but it does not eliminate it. Tar still gets into the lungs.

TOBACCO-RELATED DISEASES

Tobacco products have been linked to many kinds of cancer. Smoking is the major cause of two deadly lung diseases, lung cancer and emphysema. A person with emphysema often has shortness of breath.

Smoking cigarettes is not the only culprit. People who smoke pipes or cigars also develop cancers. Smokers often develop cancer of the lungs, bladder, kidneys, pancreas, mouth, larynx, esophagus, cheek, lip, and tongue.

Chewing tobacco causes cancer of the mouth. In fact, cancer from chewing tobacco often develops faster than other kinds of cancer.

YOU BE THE DOCTOR

The symptoms of emphysema and lung cancer are described below. Read the description and see if you can identify the illness.

Illness A: Tobacco smoke damages the lungs' air sacs. They become clogged with phlegm. Fresh air cannot enter. Stale air becomes trapped and cannot be exhaled. The walls of the air sacs break down. This leaves large spaces inside the lungs. Breathing becomes difficult. Oxygen supply to the body is reduced. The heart tries to make up for this by working harder and harder. Finally the heart stops. The result is death from heart failure.
Illness B: Normal cells become abnormal. They multiply rapidly. As they multiply, they push aside and destroy healthy cells. The abnormal cells usually spread to other parts of the body. The life processes are reduced so much that death occurs.

Decide which of the above illness is describing cancer, and which one is describing emphysema.

Ask yourself this question. “Is it worth it?” If you are a smoker, stop NOW, before it is too late. If you do not smoke, NEVER start.

It’s a horrible way to die.

Assignment #3: Tobacco

HARMFUL EFFECTS OF SMOKING ON THE HUMAN BODY
FILL IN THE BLANK

Use the above picture and what you have learned to answer the following questions.- (5 marks)

1. What is tobacco?
   ______________________________________________________________

2. What are the three harmful products found in tobacco?
   ______________________________________________________________

3. What effect does carbon monoxide have on the body?
   ______________________________________________________________

4. What effect does nicotine have on the body?
   ______________________________________________________________

5. What happens to tar after a smoker breathes out tobacco smoke? _________________
FILL IN THE BLANK
Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some words may be used more than once. (10 marks)

nicotine  carbon monoxide  tar
pipes  plant  heart
cigars  cancer  chewing tobacco
stimulant  emphysema

1. What are three harmful substances in tobacco? 1. __________, 2. _________, 3. _______
2. Nicotine is a _____________ drug.
3. A sticky yellowish substance is __________
4. The poisonous gas caused by burning tobacco is ______________________.
5. Tobacco used in cigarettes comes from the tobacco ____________.
6. Other forms of smoking include the use of _____________ and ______________.
7. Cancer of the mouth often is related to use of ____________________________.
8. Shortness of breath is a symptom of ______________.
9. ________________ is the rapid division of normal cells.
10. Smoking puts a great strain on the ________________.

MATCHING
Match each term in Column A with its description in Column B. Put your answer in the Column titled, Your Answer. You are to take the each letter beside an item in Column B and write it beside the item in Column A that it is describing. (6 marks)

<table>
<thead>
<tr>
<th>Your Answer</th>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>carbon monoxide</td>
<td>A</td>
<td>yellow sticky substance found in tobacco</td>
</tr>
<tr>
<td>tar</td>
<td>B</td>
<td>characterized by shortness of breath</td>
</tr>
<tr>
<td>nicotine</td>
<td>C</td>
<td>abnormal cells replacing healthy cells</td>
</tr>
<tr>
<td>emphysema</td>
<td>D</td>
<td>poisonous gas</td>
</tr>
<tr>
<td>lung cancer</td>
<td>E</td>
<td>stimulant drug</td>
</tr>
<tr>
<td>nicotine</td>
<td>F</td>
<td>Narrows blood vessels in hands and feet</td>
</tr>
</tbody>
</table>
REACHING OUT
You do not have to be a smoker to suffer from smoke-related problems. If you are in the same room with a smoker, you will breathe in their smoke. Evidence indicates that this smoke, called second-hand smoke, is just as damaging as the smoke from active smoking.

Many organizations have now banned smoking or restricted smoking areas. This has caused arguments between smokers and non-smokers. The smokers claim they have the right to smoke anywhere. The non-smokers claim that they should not be exposed to harmful smoke.

Who do you think is right? In the space below, write your argument for or against the smokers. There is no right or wrong answer, but explain your reasons. (4 marks)
Lesson 5: Facts about Smoking

Facts About Smoking

Cigarette smoking is a serious health issue. It is also a serious economic issue. Cigarette production is a sixteen-billion dollar manufacturing industry. It employs thousands of people. A great number of farm families make their living growing tobacco. Smoking is also a civil rights issue. People have argued for centuries about whether or not smokers have a right to smoke in public, where non-smokers can breathe their smoke. Personal health however, remains the important issue. How did smoking and the use of tobacco get started in Canada and the United States?

The native peoples of North and South America began growing and using tobacco a long time ago. Explorers from Europe learned from them how to smoke and returned to Europe with tobacco in their hands. Once they introduced the habit to Europeans, the practice of smoking spread quickly. Tobacco was smoked at first mainly in pipes, then in the form of cigars.

Read the following article to get an idea of the history of tobacco and its early uses.

Native Peoples had strong taboos against the touching and use of certain herbs by non-native white folks. Still, tobacco was offered to the invading white government in a gesture of friendliness and peace. As such, it was often mocked by the white people as the “Indian peace pipe”.

Native Blessing or Whiteman’s Curse

Tobacco was universally regarded by the native peoples of North and South America as a sacred herb; it was highly esteemed for ceremonial purposes and was a widely traded article between tribes. Its use dates so far back into antiquity it is hard to discern.

A member of the Solanaceae family, which includes belladonna or deadly nightshade, tomatoes, peppers, potatoes, eggplants and okra, tobacco is an aromatic herb often cultivated as nicotiana flowers in gardens. It is hard on the soil, taking out huge amounts of nitrogen during its growth. There are many subspecies of tobacco found throughout North and South America. The finest smoking tobacco was first grown in Cuba, and species of this variety were later cultivated in Virginia as the first major cash crop exported from the Americas.

Aztecs listed two uses for tobacco: 1) in a tea, for diarrhea; and 2) with salt and pepper as an abdominal purgative. The Mayans used it more extensively for conditions such as asthma, bites and stings, bowel complaints, chills, fever, convulsions, nervous ailments, sore eyes, skin diseases and urinary ailments. The Choctaw Indians blew tobacco smoke on snakebites, while the modern Seminoles used tobacco as a magical charm to ward off danger and disease. In Guiana tobacco juice was given to induce vomiting. Some South American tribes cultivated it almost exclusively as an insecticide against certain fly larvae parasitic to the skin. Tobacco’s toxic alkaloid, nicotine, is one of the best organic insecticides to protect plants from insect damage.

Before the coming of the white settlers, tobacco addiction was virtually unknown among the native tribes. Usually only one or two puffs were taken to relax before going to sleep at night, or it was used in the sweat lodge or in ceremonies. With the coming of the white folk and miners, tobacco addiction became a fact among both races. It was not until after Columbus and later Sir Walter Raleigh introduced tobacco in Europe, that its medicinal uses first were expounded upon by the whites. By 1586, its use as a smoking herb was established enough to be regarded by King James I as a “disgusting habit,” and before the end of the 16th century there were numerous medicinal uses by the Europeans, who rapidly recorded it as a cure for a wide range of diseases. This was remarkable, since other Indian remedies were only adopted in European medicine much later.

A medicinal tract published in 1595 under the name A.C. is representative: “Who hath ever found a more sovereign remedy against coughs, rheum in the stomach, head and eyes?” The tract further recommended the external applications of steamed tobacco leaves for gout and as a syrup to dissolve gosse humors, to ease hard drawing of the breath, break an old cough or feume, and dissolution of hard swellings in and on the body.”

In rural Ontario it was used as a snuff to allay allergies and hayfever. Dr. Bigelow, an old time American doctor, used tobacco as a diuretic tea for dropsy (water swelling), blood in the urine and as a cathartic enema to relieve strangulated hernia. A strong tea of tobacco leaves was sometimes drunk for bad breath and headache.

A poultice was made for asthma, bronchial and lung congestion by steaming the leaves until soft and applying it directly at least a quarter inch thick to the back or chest. Tobacco was also externally applied to the stomach to facilitate the expulsion of worms in children. The most frequent usage of tobacco was to chew a wad and apply it directly to venous bites and stings to stop the pain and draw out the poison. Chewing a wad of tobacco leaves (of course the organic tobacco, which is untreated with salt-peter, sulphur and other chemicals) and applying the wad directly to venous bites, stings, burns and sprains gives almost instantaneous relief from pain and serves as an antidote for associated poisons.
CIGARETTES

Cigarettes, which are less awkward than cigars and less smelly, became popular in the 19th century. People first used cigarettes in the "roll-your-own" form. Gradually after 1876 the machine-rolled form of cigarette was produced. During the first half of the 20th century cigarette smoking grew and spread very quickly throughout North America.

Then came the studies that linked cigarette smoking to cancer. In the 1950s the Canadian Cancer Society and other organizations concerned with fighting cancer looked closely at the link...
between cigarette smoking and all sorts of diseases, from cancer and emphysema to ulcers and heart disease. They found that heavy smokers' chances of getting lung cancer are much higher than those of nonsmokers. Smokers also have a 500% greater chance of developing cancer of the pancreas and a 100% greater chance of having a stroke. Pregnant women are placing their unborn children at risk when they smoke. Tests show a dramatic decrease in the heart rate of the fetus when the mother smokes a cigarette.

In this lesson, we will explore the topic of tobacco and smoking. We do hope that you learn something new about the use and effects of tobacco.

**TOBACCO CHEMISTRY**

When tobacco is burned, it gives off harmful ingredients in its smoke. Two of the most harmful are nicotine and tars, chemicals that remain in the body after tobacco smoke is inhaled. Become familiar with the words associated with tobacco and smoking by doing the assignment in the workbook. Use a dictionary to help you learn the meanings of the words.

**Assignment #1: Facts About Smoking**

**WRITE THE MEANINGS OF THE WORDS**

Below is a list of words that relate to cigarette smoking. How many do you know? Use your dictionary to help in your understanding. Write the meanings of those words printed in bold.

(20 marks)

<table>
<thead>
<tr>
<th>lungs</th>
<th>addiction</th>
<th>cancer</th>
<th>lip</th>
<th>tobacco</th>
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<tbody>
<tr>
<td>air sacs</td>
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<td>tongue</td>
<td>mouth</td>
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</tr>
<tr>
<td>bronchial</td>
<td>tar</td>
<td>pharynx</td>
<td>larynx</td>
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<tr>
<td>cough</td>
<td>nicotine</td>
<td>carcinogens</td>
<td>esophagus</td>
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<td>menthol</td>
<td>heart</td>
<td>pack</td>
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<tr>
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<td>benign</td>
<td>malignant</td>
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<td>caution</td>
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<td><strong>tumour</strong></td>
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<tr>
<td><strong>hazardous</strong></td>
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<td><strong>toxin</strong></td>
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<tr>
<td>cilia</td>
<td>respiratory</td>
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<tr>
<td>sputum</td>
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**HOW SMOKING AFFECTS YOUR HEALTH**

**ANSWER THE FOLLOWING QUESTIONS**

1. What harmful substances are produced when tobacco is smoked? (1 mark)

2. What makes some teenagers feel pressured to smoke? (1 mark)
3. How does nicotine affect the heart and circulatory system? (2 marks)

4. What are 5 disadvantages of smoking? (5 marks)

The use of tobacco is psychological and physical addiction. It is a habit for more than fifty million people. Most smokers started smoking when they were teenaged or younger. They associate smoking with being one of the gang, looking “adult” or “cool”. However, like everyone else, teenagers are becoming less impressed with smokers and smoking. Most smokers will tell you to never start smoking, or to stop if you have already started. They don’t enjoy getting sick more often than non-smokers, and they know that one out of seven deaths every year is from diseases caused by smoking. Each year the tobacco industry loses 300,000 of its best customers through death from smoking.

The physical addiction to smoking comes from craving nicotine. Nicotine makes the heart pump faster. Blood pressure increases. For a short time, the smoker feels more energetic. But this feeling comes at the expense of the heart and the circulatory system. In return for their money, (a large package of cigarettes costs approximately $7.50, at the time of writing)

Smokers may get a hacking cough, upset stomach, a dry mouth, and headaches. The smell of stale smoke hovers around them and they are often made to feel unwelcome. If that isn't bad enough, every smoker is damaged to some degree because tobacco upsets the body’s homeostasis, or natural internal balance.

SMOKING AND LUNG CANCER

The incidence of lung cancer is ten times greater in smokers than in non-smokers. People who smoke more than a pack a day have a twenty times greater chance of getting lung cancer than people who don’t smoke at all.

When cigarette smoke is inhaled, eighty to ninety percent of the smoke remains in the body. A residue of tar builds up in the bronchial tubes and lungs. The tar that remains irritates the cells. It is this irritation that triggers cells to become cancerous. Without question, tobacco upsets the body’s homeostasis. This occurs because cigarette smoke upsets the balance of air and blood in the lungs. The lungs are then less able to purify the blood.

5. How much does smoking increase a person’s risks of getting lung cancer? (1 mark)

6. How might smoking cause lung cancer? (1 mark)
7. What does tobacco upset? (1 mark)

8. Why is the oxygen supply of the fetus reduced when the mother smokes? (2 marks)

9. Outline 3 effects smoking during pregnancy has on the newborn baby? (3 marks)

10. List 3 effects that second-hand smoke has on children. (3 marks)

11. The facts about smoking have been well publicized, yet young people still start smoking. Very few people start smoking after age 25.

   a) Why do you feel young people start this habit? (2 marks.)

   b) Make a list of the pros and cons of smoking (at least 3 of each one) from the point of view of an individual teenager. (6 marks)

<table>
<thead>
<tr>
<th>PROS</th>
<th>CONS</th>
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12. Everyone knows somebody who is a smoker (or a former smoker) who has tried to give up the habit. Talk to at least 2 or 3 such people and ask them what problems they had quitting. List 5 problems these people had in trying to stop smoking. (5 marks)

   a) 
   b) 
   c) 
   d) 
   e) 

**HOW SMOKING AFFECTS CHILDREN**

A lot is now known about the effects of smoking on the unborn baby, or fetus, and on young children. The following article is adapted from a Lung Association publication.

Before such facts were discovered and made widely known, people were unaware of the effects of cigarette smoke on children. Now that the hazards are well publicized, we can make intelligent decisions to safeguard the health of our children.
PIPES AND CIGARS

People who smoke pipes and cigars instead of cigarettes reduce some hazards to their health, but increase others.

Most pipe and cigar smokers just puff away. Some do inhale, though. With cigarette smokers, the picture is just the opposite. Very few don't inhale.

Because most pipe and cigar smokers don't inhale, the smoke filled with harmful particles and noxious gases does not bombard their lung tissue and seep into their bloodstream. As a result, their chances of developing coronary heart disease or severe lung diseases (chronic bronchitis, emphysema, lung cancer) are smaller than those of cigarette smokers.

When people who smoke pipes and cigars do inhale, as they do with certain brands and in some countries, their chances of developing serious heart and lung diseases are even higher than cigarette smokers. These chances increase when they inhale deeply and often.

There is a special danger for cigarette smokers who switch to pipes and cigars. Some studies show that smokers who switch have established patterns of inhaling. These ex-cigarette smokers are more likely to inhale tobacco smoke than people who have always smoked pipes and cigars. But even when these switchers report that they do not inhale, studies show that many of them do inhale unintentionally or by "accident". And the amount inhaled depends on the time the pipe is lit and the time the cigar is held in the mouth.
EXPOSURE TO TOBACCO SMOKE

Even when tobacco smoke that is not directly inhaled, it can still affect the sites of the body that it touches. Hot smoke lingers inside the mouth and can travel into the throat and windpipe, even into the upper breathing passages. Smoke may be dissolved in the saliva and absorbed by the mucous membranes of the mouth. It can be swallowed in saliva and enter the digestive tract. So you see, you do not have to inhale to expose all these sites to the harmful effects of hot smoke!

Because of this exposure, the incidence of cancer of the mouth, throat, larynx (voice box), and stomach is as high for cigar and pipe smokers as for cigarette smokers. Some experiments indicate there is a higher degree of cancer-causing agents in cigar and pipe tars than in cigarette tars. Pipe smoking, either alone or in combination with other forms of smoking, seems to be a direct cause of cancer of the lip.

PREMATURE DEATH RATES

In general, smokers who limit themselves to pipes and cigars live longer than cigarette smokers. But they do not live as long as non-smokers. At the same time, people who smoke cigars and pipes have higher premature death rates for certain specific causes, like cancer of the lip, mouth, throat, voice box, and stomach. Choosing not to smoke is, of course, the best alternative!

LITTLE CIGARS

Smokers of little cigars face all the hazards of cigar and pipe smokers and, if they inhale all the damaging effects suffered by cigarette smokers as well.

Advertising for little cigars has been removed from television and radio. Little cigars are manufactured, packaged, sold, and smoked like cigarettes. Cigarette smokers who switch to little cigars are more inclined to use them as they did cigarettes because they are similar in size and shape, number per package, burning rate, and the time it takes to smoke them.

Most brands of little cigars have even higher levels of tar and nicotine than cigarettes.

POLLUTION LEVELS

Research is just beginning on the health effects of cigar and pipe smoke on non-smokers; if you are around a smoker you become an involuntary smoker. You inhale the smoke of their cigars and pipes.

The smoke from cigars and pipes is more offensive to non-smokers than cigarette smoke; it is more irritating to the eyes, nose, throat, and breathing passages. There are higher levels of some damaging chemical compounds in pipes and cigars, like phenol and benzoapyrene, than in cigarettes.

The exact effects of cigar and pipe smoke on non-smokers have not yet been determined. But it is probably even more harmful than cigarette smoke. Inhaling second-hand smoke from
cigarettes makes the heart beat faster, steps up the blood pressure, and raises the level of carbon monoxide in the non-smoker's blood.

One study of pollution by cigar smoke shows that the smoke from nine cigars in one half-hour period polluted the air as much as the smoke from 42 cigarettes. Both types of pollution raised the level of carbon monoxide above the safety limits set for workers in industry. More and more businesses and institutions are banning smoking of all kinds from their premises. This ensures cleaner air for people to breathe, as it lowers indoor pollution levels.

During withdrawal, smokers complain of a variety of symptoms, including tightness in the chest, breathlessness, dizziness, and perspiring. There is no real need to worry about these symptoms; most of them subside within a few weeks, as they usually reflect anxiety.

**ADDITION VS. HABIT**

Addiction refers to a physical or chemical change within the body that cues you to do something. Smoking may have damaged your physical health and well-being, and the continued process can trigger chain effects of disease; it is a chemical reaction.

It is also a habit—a form of learned behaviour you have trained yourself in. This is why you can also learn to be a non-smoker. Thousands of smokers each year train themselves to be non-smokers.

**Assignment #2: How to Stop Smoking**

**ANSWER THE FOLLOWING QUESTIONS**

1. If you were to give advice to a smoker that wishes to stop smoking, what four ground rules would you suggest to them? (4 marks)
   
   a)
   
   b)
   
   c)
   
   d)

2. List 4 symptoms smokers experience while going through withdrawal. (2 marks)

   a)
   
   b)
   
   c)
   
   d)
3. List 4 ways you can overcome an urge to smoke. (2 marks)
   
a)
   b)
   c)
   d)

4. Is smoking an addiction, a habit, or both? Explain your answer. (2 marks)

SMOKING QUIZ

Circle the correct answer: "T" for True, or "F" for False. (21 marks)

1. 1 out of 7 deaths per year is attributed to disease caused by smoking. T F
2. Lung cancer kills up to ten times more smokers than non-smokers. T F
3. Cigarette smoking lengthens lives. T F
4. Death rates are lower for those who start smoking at an early age. T F
5. The percentage of adults in Canada that are former smokers is 5.21% T F
6. Smoking is the chief cause of chronic bronchitis and lung cancer and a contributing factor in emphysema. T F
7. Seventy-eight thousand people die each year of lung cancer. T F
8. Death from lung cancer can be delayed up to five years only by removing the diseased lung. T F
9. Tobacco use is responsible for 30 to 40 percent of human cancers, including 85 percent of all lung cancer. T F
10. Smoking cigarettes with low tar and nicotine levels increases risk of lung cancer. T F
11. Just one cigarette upsets the balance of air and blood in your lungs. T F
12. Among smokers, the number of deaths from heart disease is almost double that of non-smokers. T F
13. Smokers take twice as many sick days as non-smokers. T F
14. It's too late to stop smoking if you've smoked five years or more. T F
15. Nicotine, a poison, causes cigarette addiction. T F
16. Giving up cigarettes, when one has been a smoker for years, is a step toward a shorter life.  
17. Smoking cigars and pipes, which aren't usually inhaled, is less of a health hazard than cigarette smoking.  
18. Women who smoke cigarettes during pregnancy tend to have babies of higher birth weight.  
19. One quarter of all Canadian teens smoke daily. By the age of twelve, half of all Canadian school children have tried smoking.  
20. Smoking is associated with accidental deaths from fire.  
21. To smoke a pack of cigarettes per day will cost around $2,625 per year.

How to Stop Smoking

These sheets are adapted from an American Heart Association pamphlet written by Dr. Donald T. Fredrickson. If you smoke, it shows why you smoke and helps you stop. If you are a nonsmoker, it gives you an understanding of a smoker’s problems and may prevent you from becoming a smoker.

Following are steps a smoker would take to break the smoking habit.

**STEP 1 - First Week**

Here are some ground rules:

1. List several personal reasons for giving up smoking.  
2. Find a partner to share your withdrawal.  
3. Agree to follow all instructions.  
4. Approach your smoking withdrawal in a positive manner.

**Instructions:**

1. Build motivation. Write down your most important reason for stopping.  
2. Write down how you should change your behaviour if you wish to succeed.  
3. Adopt a positive attitude.  
4. Develop a Cigarette Tally of your smoking behaviour on an 8.5" x 11" sheet of paper. Use this for recording information about each cigarette you smoke during the day (see the sample below).

   a) Fold the tally lengthwise twice, wrap it around your cigarette pack, and secure it with two rubber bands.  
   b) Continue smoking normally.  
   c) Every time you smoke a cigarette, open the Tally Sheet and fill in the appropriate information.
CIGARETTE TALLY SHEET

* Value is the degree of pleasure from the cigarette, expressed from 1 (least) to 5 (greatest).

STEP 2 - Second Week

If you have cut down on your smoking as a result of the opening and recording procedure, you will see that smoking is not an addiction but a habit that you have taught yourself by constantly associating smoking with certain feelings and activities.

Instructions:

1. Continue with your smoking record.
2. Write down important reasons why you want to stop smoking.
3. Carry your cigarettes in a different place.
4. Never buy a carton of cigarettes from here on! Instead, buy one pack at a time.
5. Switch your brand at least twice during the week.
6. Do not carry matches or a lighter from now on.
7. Gradually reduce the number of cigarettes you smoke. Record the number of cigarettes smoked each day.

STEP 3 - Third Week

Using the Cigarette Tally, try to determine patterns to find out why you smoke. If you do not smoke, please pretend you do and make this assessment accordingly. This will give you a deeper understanding of why people smoke.

STEP 4 - Fourth Week

Analyze what helps you ignore your urge to smoke. Some suggestions are:

1. Take a walk or exercise.
2. Substitute other activities for ones you associate with smoking:
   i.e. - if you smoke while drinking coffee, then drink juice instead.
3. Decide that cigarettes will not control you.
4. Substitute opposite gestures - move things away instead of toward you.

STEP 5 - Fifth Week

1. Get some exercise to burn up any weight gained during withdrawal.
2. Reach for low-calorie foods.
GLOSSARY INDEX

absorption [ab-SAWRP-shun]: movement of food from the digestive system to the blood
alcoholic [al-kuh-HOWL-ik]: person who is dependent on alcohol
alveoli [al-VEE-uh-Iy]: microscopic air sacs in the lungs
amino acid: building block of proteins,
arteries [ART-ur-ees]: blood vessels that carry blood away from the heart
atria [AY -tree-uh]: upper chambers of the heart

behaviour: response of an organism to its environment
bile: green liquid that breaks down fats and oils
bronchi [BRAHN-kee]: tubes leading to the lungs
capillaries [KAP-uh-Ier-ees]: tiny blood vessels that connect arteries to veins
carbohydrate [kar-buh-HY-drayt]: nutrient that supplies energy
carbon monoxide: poisonous gas produced when tobacco is burned
cardiac [KAHR-dee-ak]: type of muscle found only in the heart
cartilage [KART-ul-idj]: tough, flexible connective tissue
cerebellum [ser-uh-BELL-um]: part of the brain that controls balance and body motion
cerebrum [suh-REE-brum]: large part of the brain that controls the senses and thinking
cirrhosis [suh-ROH-sis]: liver disorder caused by damaged liver cells
conditioned response: behavior where one stimulus takes the place of another
digestion [dy-JES-chun]: process by which foods are changed into forms the body can use
drug: any chemical substance that causes a change in the body
drug abuse: improper use of a drug
egg: female reproductive cell
embryo [EM-bree-oh]: hollow ball of cells formed by cell division of the zygote
endocrine [EN-duh-krin) system: body system made up of about ten endocrine glands that help the body respond to changes in the environment
enzyme [EN-zym]: protein that controls chemical activities
esophagus [i-SAF-uh-gus]: tube that connects the mouth to the stomach
excretion [ik-SKREE-shun]: process of removing waste products from the body
excretory system: body system responsible for removing wastes from the body
fat: energy-storage nutrient
fertilization [fur-tul-I-ZAY-shun]: joining of one sperm cell and one egg cell

habit: learned behavior that’s become automatic
hormone [HAWR-mohn]: chemical messengers that regulate body functions

joint: place where two or more bones meet

ligaments [LIG-uh-ments]: tissue that connects bone to bone

marrow: soft tissue in a bone that makes blood cells
medulla [muh-DULL-uh]: part of the brain that controls the heartbeat and breathing rate
mineral: nutrient needed by the body to develop properly
nervous system: body system made up of the brain, the spinal cord, and all the nerves that control body activities
neuron [NOOR-ahn]: nerve cell
nicotine [NIK-uh-teen]: stimulant drug found in tobacco
nutrient [NOO-tree-unt]: chemical substance in food needed by the body for growth, energy, and life processes
organ [OWR-gun]: groups of tissues that join together to do a specific job
organ system: group of organs that work together
ovaries [OH-vuhr-eez]: female reproductive organs
peristalsis [per-uh-STAWL-sis]: wavelike movement that moves food through the digestive tract
placenta [pluh-SEN-tuh]: organ through which an embryo receives nourishment and removes wastes
plasma [PLAZ-muh]: liquid part of blood
platelets [PLAYT-lits]: tiny colorless pieces of cells that control blood clotting
protein [PRO-teen]: nutrient needed by the body to build and repair cells
red blood cells: cells that give blood its red color and carry oxygen reflex: automatic response to a stimulus
respiration [res-puh-RAY -shun]: process of carrying oxygen to cells, removing of carbon dioxide, and releasing energy
septum: thick tissue wall that separates the left and right sides of the heart
skeletal muscle: muscle attached to the skeleton, making movement possible
smooth muscle: muscle that cause movements that you cannot control
specialized [SPESH-uh-lyzed] cells: cells that are similar in size and shape
sperm: male reproductive cell
tar: sticky, yellow substance found in tobacco
testes [TES-teez]: male reproductive organs
tissues: group of similar cells that work together to perform a specific function
trachea [TRAY-kee-uh]: windpipe
valve: thin flap of tissue that acts like a one way door
veins [VANES]: blood vessels that carry blood to the heart
ventricle [VEN-tri-cul]: lower chamber of the heart
villi [VIL-y]: fingerlike projections on the lining of the small intestine
vitamin [VYT-uh-min]: nutrient found naturally in many foods
white blood cells: cells that protect the body from disease
zygote [ZY -gote]: fertilized egg produced by fertilization